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SWEEP

SOIL AND WATER

ENVIRONMENTAL

ENHANCEMENT PROGRAM

PAMPA

PROGRAMME D'AMÉLIORATION

DU MILIEU PÉDOLOGIQUE

ET AQUATIQUE

Canada

Ontario

[redacted]

SWEEP

*is a $30 million federal-provincial agreement, announced May 8, 1986, designed to improve soil and water quality in southwestern Ontario over the next five years.*

## PURPOSES

*There are two interrelated purposes to the program; first, to reduce phosphorus loadings in the Lake Erie basin from cropland run-off; and second, to improve the productivity of southwestern Ontario agriculture by reducing or arresting soil erosion that contributes to water pollution.*

## BACKGROUND

*The Canada-U.S. Great Lakes Water Quality Agreement called for phosphorus reductions in the Lake Erie basin of 2000 tonnes per year. SWEEP is part of the Canadian agreement, calling for reductions of 300 tonnes per year — 200 from croplands and 100 from industrial and municipal sources.*

PAMPA

*est une entente fédérale-provinciale de 30 millions de dollars, annoncée le 8 mai 1986, et destinée à améliorer la qualité du sol et de l'eau dans le Sud-ouest de l'Ontario.*

## SES BUTS

*Les deux buts de PAMPA sont: en premier lieu de réduire de 200 tonnes par an d'ici 1990 le déversement dans le lac Erie de phosphore provenant des terres agricoles, et de maintenir ou d'accroître la productivité agricole du Sud-ouest de l'Ontario, en réduisant ou en empêchant l'érosion et la dégradation du sol.*

## SES GRANDES LIGNES

*L'entente entre le Canada et les États-Unis sur la qualité de l'eau des Grands Lacs prévoyait de réduire de 2 000 tonnes par an la pollution due au phosphore dans le bassin du lac Erie. PAMPA fait partie de cette entente qui réduira cette pollution de 300 tonnes par an — 200 tonnes provenant des terres agricoles et 100 tonnes provenant de sources industrielles et municipales.*

100-05239/

# 1990 SURVEY OF ONTARIO

# TILLAGE AND SOIL CONSERVATION:

# PRACTICES, PERCEPTIONS AND ATTITUDES

# EXECUTIVE SUMMARY

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Guelph, Ontario

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## 1.0 INTRODUCTION

Deloitte & Touche have undertaken a syndicated multi-client survey of Ontario corn producers for the previous fifteen years. This survey provides agribusiness clients with detailed information on the Ontario seed market, the Ontario corn rootworm market and provides a basis for asking other related agronomic questions.

In 1990, the survey incorporated some questions on attitudes towards and use of various tillage and soil conservation practices on behalf of Agriculture Canada. This report presents the key findings of this 1990 Soil Tillage Conservation Survey among corn producers. Detailed tables and survey protocol are provided in a separate report.

### 1.1 Objectives of Survey

The principle aim of the survey was to identify current soil conservation practices and trends in specific practice areas. Additionally, an aim of the survey was to identify current attitudes and perceptions towards these practices among Ontario corn producers. Further, the survey findings and protocols were designed to act as a bench mark for future evaluations. Specific questions were designed to quantify and address the following topic areas:

- Structure of corn production
- Cropping practices
- Soil and water conservation problems encountered by Ontario Corn Producers
- Soil and water conservation practices employed by Ontario Corn Producers
- Perceived trends and rationale for implementing soil and water conservation practices
- Attitudes towards specific soil and water programs and practices

## 1.2 Sample Selection and Structure

A total of 498 corn producers throughout Ontario participated in the study. Survey respondents were stratified by geographic region and corn production size group, in order to ensure a balanced geographic representation of survey respondents and coverage of the total corn acreage. Responses to survey questionnaires were subsequently weighted to reflect the distribution of corn producers in the province.

Survey findings were cross tabulated by geographic region, corn acreage, type of farm operation, farm size and age of producer. Where applicable, survey response was further categorized according to soil type and slope class. Sample characteristics, according to survey region, are displayed in Table 1.1.

The distribution of producers and their primary farming activities reflect the current farming patterns of corn production and corn producers across the province. The predominant farm enterprise types include cash cropping and dairy, which accounted for 33% each of total accounting respondents. Cash cropping is predominant in the western survey regions, in particular, the Essex, Kent and Lambton region (73%), and the Middlesex and Elgin region (50%). In contrast, dairy production dominates the central and eastern survey regions, particularly, the Bruce to Halton and Durham region (52%) and the Victoria and East region (56%).

Corn production levels show some variation across the province with significantly higher concentrations of production in the western part of the province.

## TABLE 1.1 REGIONAL STRUCTURE AND ENTERPRISE MIX OF SURVEY FARMS (% OF RESPONDENTS)

| FEATURE | TOTAL | ESSEX KENT & LAMBTON | MIDDLESEX & ELGIN | OXFORD BRANT HAMILTON NIAGARA HALDIMAND NORFOLK | HURON PERTH WATERLOO | BRUCE TO HALTON & DURHAM | VICTORIA & EAST |
|---|---|---|---|---|---|---|---|
| Type of Farm Operation | | | | | | | |
| Cash crop | 33 | 73 | 50 | 32 | 25 | 8 | 15 |
| Dairy | 33 | 3 | 18 | 37 | 29 | 52 | 56 |
| Beef | 12 | 7 | 12 | 6 | 3 | 21 | 22 |
| Hog | 10 | 7 | 1 | 13 | 23 | 11 | 1 |
| Poultry | 2 | 0 | 3 | 3 | 1 | 2 | 1 |
| Mixed | 11 | 9 | 16 | 9 | 20 | 7 | 5 |
| Average Corn Acres (Acres) | 93 | 115 | 95 | 100 | 83 | 84 | 80 |
| Average Corn Acres as a % of Acres Farmed | 31 | 33 | 36 | 38 | 33 | 23 | 23 |
| Respondents (#'s) | 498 | 79 | 79 | 84 | 88 | 80 | 88 |
| Respondents (%) | 100 | 16 | 16 | 17 | 18 | 16 | 18 |

## 2.0 BIOPHYSICAL CHARACTERISTICS OF SAMPLE FARMS

In order to further evaluate the structure and relationships of soil tillage and conservation in Ontario, soil type, slope class and cropping rotation patterns were recorded for all survey respondents.

### 2.1 Soil Type and Slope Class

Soil type was stratified into five groups; Coarse or Sandy, Medium or Silt Loam, Fine or Clay Loam, Organic and Mixed (Table 2.1). The predominate soil type of the surveyed farms was Fine or Clay Loam (47%), followed by Medium or Silt Loam (27%), Mixed (14%), Course or Sandy (11%) and Organic (1%). Similarly, farm slope classes were developed reflecting the varied topographic conditions encountered across the province. Of the producers surveyed, 54% farmed primarily flat land, 37% farmed primarily rolling land, 8% farmed mixed land and 1% farmed land with predominantly steep slopes.

### 2.2 Crop Rotations

Crop rotations displayed high variability between survey regions (Table 2.2). Overall, corn following corn from 1989 to 1990 accounted for 53% of the rotation activity. Soybeans accounted for 22%; mixed grain (13%), wheat, alfalfa and white beans (each 3%), hay (2%) and beans unspecified (1%). Continuous corn was highest in the central region (68%) and lowest in the south west region (33%). Consistent with this, was the corn soybean rotation in the two regions; that is, 7% for the central region and 59% for the southwest region.

**TABLE 2.1 STRUCTURE OF SOIL TYPE AND SLOPE CLASSES FOR SURVEY RESPONDENTS**

| SOIL TYPE | % OF RESPONDENTS | SLOPE CLASS | % OF RESPONDENTS |
|---|---|---|---|
| Coarse or Sandy | 11 | Flat Land | 54 |
| Medium or Silt Loam | 27 | Rolling Land | 37 |
| Fine or Clay Loam | 47 | Mixed | 8 |
| Organic | 1 | Steep Slopes | 1 |
| Mixed | 14 | | |

## TABLE 2.2 1990 CROPS PLANTED ON 1989 CORN FOR SURVEY FARMS (% OF ACREAGE)

| CROPS | TOTAL | ESSEX KENT & LAMBTON | MIDDLESEX & ELGIN | OXFORD BRANT HAM. NIAG. HALDIMAND. NORFOLK | HURON PERTH WATERLOO | BRUCE TO HALTON & DURHAM | VICTORIA & EAST |
|---|---|---|---|---|---|---|---|
| CORN | 53 | 33 | 45 | 61 | 51 | 68 | 62 |
| SOYBEANS | 22 | 59 | 35 | 13 | 7 | 7 | 7 |
| MIXED GRAIN | 13 | 3 | 6 | 14 | 18 | 18 | 19 |
| WHEAT | 3 | 2 | 4 | 3 | 6 | 3 | 2 |
| ALFALFA | 3 | 1 | 2 | 5 | 4 | 2 | 3 |
| WHITE BEANS | 3 | 1 | 1 | 0 | 11 | 1 | 1 |
| HAY UNSPEC. | 2 | 0 | 6 | 1 | 2 | 0 | 5 |
| BEANS UNSPEC. | 1 | 1 | 1 | 3 | 1 | 1 | 1 |
| 1989 CORN ACREAGE (K)[1] | 2252 | 392 | 349 | 331 | 416 | 374 | 390 |

[1] Statistics Canada Crop Estimates

## 2.3 Acreage Group by Farm Type

Cash cropping and dairy farms account for the largest farm sizes and corn acreages across the province. A very high percentage of the large corn operations (250 acres or more) are on cash crop farms (54%). Additionally, cash crop operations and beef producers maintain the greatest proportion of large farming enterprises (38% of cash crop operations are on farms greater than 550 acres, similarly, 22% of beef operations are on farms greater than 550 acres). Overall, cash crop and dairy operations account for more than 50% of all farm size and corn acreage categories (Table 2.3).

## TABLE 2.3 FARM SIZE AND CORN ACREAGE BY FARM TYPE

| Type of Farm Operation | FARM SIZE | | | | CORN ACREAGE | | | |
|---|---|---|---|---|---|---|---|---|
| | Less than 200 | 200 to 349 | 350 to 549 | 550 or More | 10 to 50 Ac. | 51 to 100 Ac. | 101 to 250 Ac. | 251 Ac. or More |
| | —— % of respondents —— | | | | | | | |
| Cash Crop | 32 | 32 | 34 | 38 | 26 | 35 | 43 | 54 |
| Dairy | 32 | 36 | 41 | 18 | 39 | 34 | 20 | 12 |
| Beef | 7 | 12 | 13 | 22 | 16 | 6 | 11 | 4 |
| Hog | 15 | 9 | 2 | 4 | 8 | 13 | 10 | 7 |
| Poultry | 1 | 3 | 1 | 1 | 1 | 3 | 1 | 2 |
| Mixed | 12 | 8 | 9 | 17 | 10 | 9 | 14 | 20 |

## 3.0 SOIL AND WATER PROBLEMS IDENTIFIED ON SURVEY FARMS

A variety of soil and water problems were identified throughout the province. Overall, soil compaction was identified as the most prevalent problem on survey farms (Table 3.1). A total of 44% of the respondents identified soil compaction as a problem.

Wind and water erosion (31%) were also identified as significant soil and water problems. Some regional variability exists regarding soil and water problems.

Poor soil structure (15%), loss of fertility (12%), loss of water holding capacity (12%), loss of organic matter (11%) and ground water contamination (6%) were less frequently mentioned problems.

Soil compaction problems obviously vary by region and are much more likely to be identified as a problem by younger producers (those aged 35-44), (55% mentioning problem) than those producers over 55 years of age (29% mentioning problem) (Table 3.2).

Producers in the five county areas of Essex, Kent, Lambton, Middlesex and Elgin were also much more likely to mention soil compaction as a problem (56%) than those producers in the south east and central corn growing areas of the province.

Wind erosion problems varied by soil type and, to a certain extent, by region (Table 3.3). Younger producers again were likely to mention the problem relative to their older counterparts. Water erosion had a greater degree of variability in terms of the frequency of mention by specific producer groups. The frequency of mention of water erosion problems had a strong regional and age of producer variability. Hog producers seemed particularly sensitive to this issue. Those producers with mixed soil types and mixed slopes on their farms also appeared more sensitive to water erosion problems. Water erosion was seen to be much less of a problem on coarse, sandy soil farms.

## TABLE 3.1 SOIL & WATER PROBLEMS MENTIONED BY REGION

| S.W. PROBLEM | TOTAL | ESSEX KENT & LAMBTON | MIDDLESEX & ELGIN | OXFORD BRANT HAMILTON NIAGARA HALD - NOR | HURON PERTH WATERLOO | BRUCE TO HALTON & DURHAM | VICTORIA & EAST |
|---|---|---|---|---|---|---|---|
| | | | | % of respondents | | | |
| COMPACTION | 44 | 61 | 52 | 29 | 45 | 30 | 47 |
| WIND EROSION | 31 | 31 | 34 | 25 | 38 | 29 | 27 |
| WATER EROSION | 30 | 25 | 42 | 23 | 43 | 23 | 25 |
| POOR SOIL STRUCTURE | 15 | 23 | 15 | 19 | 18 | 4 | 12 |
| LOSS OF FERTILITY | 12 | 6 | 18 | 9 | 19 | 8 | 12 |
| LOSS OF WATER HOLDING CAPACITY | 12 | 15 | 5 | 16 | 10 | 8 | 15 |
| LOSS OF ORGANIC MATTER | 11 | 8 | 17 | 12 | 17 | 2 | 9 |
| GROUND WATER CONTAMINATION | 6 | 3 | 4 | 4 | 10 | 9 | 6 |

## TABLE 3.2 IDENTIFICATION OF SOIL CONPACTION AS A PROBLEM ON CORN PRODUCING FARMS BY PRODUCER GROUP

| PRODUCER GROUP | FREQUENCY OF MENTION OF PROBLEM | NO. OF RESPONDENTS IN GROUP | |
|---|---|---|---|
| | | Sample | Group |
| | — % of sample — | # | % |
| Region: South West[1] | 61 | 79 | 16 |
| Producers: 35–45 years of age | 55 | 131 | 26 |
| Region: South[2] | 52 | 79 | 16 |
| Fine/Clay Loam Soil Farms | 56 | 234 | 47 |
| Hog Producer | 50 | 48 | 10 |
| Producers under 35 years of age | 50 | 122 | 25 |
| Total Province | 44 | 498 | 100 |
| 51 - 100 acres corn | 38 | 128 | 26 |
| 350 - 549 acre farms | 38 | 86 | 17 |
| Mixed livestock and crop farms | 37 | 121 | 24 |
| Coarse sand and soil farms | 37 | 53 | 11 |
| Regions: Central[3] | 30 | 80 | 16 |
| Region: Southeast[4] | 29 | 84 | 17 |
| Producers over 55 years of age | 29 | 149 | 30 |

[1] Essex Kent Lambton
[2] Middlesex Elgin
[3] Bruce to Halton and Durham
[4] Oxford, Brant, Haldimand Norfolk, Hamilton-Wentworth and Niagara

## TABLE 3.3 FREQUENCY OF MENTION OF WIND AND WATER EROSION PROBLEMS BY CORN PRODUCER GROUPS

| PRODUCER GROUP | FREQUENCY OF MENTION OF PROBLEM % | PRODUCER GROUP | FREQUENCY OF MENTION OF PROBLEM % |
|---|---|---|---|
| WIND EROSION | | WATER EROSION | |
| Mixed soil type farms | 47 | Hog producers | 56 |
| Mixed slope farms | 41 | Region: West [1] | 43 |
| Young producers (under 35) | 40 | Region: South [3] | 42 |
| Medium/silt loam farms | 40 | Young producers (under 35) | 43 |
| Large scale corn growers (251 acres plus) | 40 | Young producers (35–44) | 43 |
| Hog producers | 39 | Large scale farms | 42 |
| Region: West [1] | 38 | Large scale corn growers (251 acres plus) | 41 |
| Coarse/sandy soil farms | 38 | Mixed soil type farms | 37 |
| | | Mixed slope farms | 36 |
| TOTAL | 31 | TOTAL | 30 |
| 51–100 acres of corn | 25 | | |
| Region: Southeast [2] | 25 | | |
| Older producers (55 and over) | 22 | Region: Southeast [2] | 23 |
| Mixed farm operators | 21 | Region: Central [4] | 23 |
| Fine clay loam farms | 20 | Older producers (45–54) | 23 |
| | | Coarse/sandy soil farms | 19 |
| | | Older producers (55 plus) | 14 |

[1] Huron Perth Waterloo
[2] Oxford, Brant, Hamilton–Wentworh, Haldimand–Norfolk, Niagara
[3] Middlesex, Elgin
[4] Bruce to Halton and Durham

## 3.1 Perceptions Regarding the Severity of Soil and Water Problems

Respondent perceptions of the severity of soil and water problems identified in Section 3.0 were recorded according to the following interval scale:

1 - very severe
2 - severe
3 - moderate
4 - minor

Both variability and mean scores were consistent across virtually all producer groups. All the individual mean scores indicate that soil and water problems are perceived as moderate to minor concern for those experiencing the problems. Some minor variations occurred between survey regions (Table 3.4) For example, Oxford to Haldimand-Norfolk, and the Huron, Perth and Waterloo regions perceive overall soil and water problems as slightly more severe than the remaining regions. In contrast Bruce to Halton and Durham region perceive overall soil and water problems as slightly less severe than the remaining ones.

## TABLE 3.4 * SEVERITY OF SOIL AND WATER PROBLEMS BY REGION

| SOIL & WATER PROBLEM | TOTAL | ESSEX KENT & LAMBTON | MIDDLESEX & ELGIN | OXFORD BRANT HAMILTON NIAGARA HALDIMAND NORFOLK | HURON PERTH WATERLOO | BRUCE TO HALTON & DURHAM | VICTORIA & EAST |
|---|---|---|---|---|---|---|---|
| | | | | mean perception scores | | | |
| SOIL COMPACTION | 3.4 | 3.5 | 3.6 | 2.9 | 3.5 | 3.4 | 3.6 |
| WIND EROSION | 3.6 | 3.3 | 3.5 | 3.8 | 3.7 | 3.7 | 3.8 |
| WATER EROSION | 3.6 | 3.6 | 3.6 | 3.3 | 3.5 | 3.9 | 3.8 |
| POOR SOIL STRUCTURE | 3.4 | 3.5 | 3.4 | 3.1 | 3.2 | 3.8 | 3.7 |
| LOSS OF FERTILITY | 3.3 | 3.9 | 3.4 | 2.8 | 3.2 | 4.0 | 3.3 |
| LOSS OF WATER HOLDING CAPACITY | 3.2 | 3.0 | 3.5 | 2.8 | 3.1 | 3.9 | 3.6 |
| LOSS OF ORGANIC MATTER | 3.4 | 3.6 | 3.2 | 3.7 | 3.3 | 3.9 | 3.6 |
| GROUND WATER CONTAMINATION | 3.4 | 3.5 | 3.9 | 4.0 | 2.8 | 3.8 | 2.9 |
| OVERALL TOTALS | 3.4 | 3.5 | 3.5 | 3.3 | 3.3 | 3.8 | 3.5 |

* Rating Scale of 1 = Very Severe
2 = Severe
3 = Moderate
4 = Minor

## 4.0 PERCEPTIONS OF SOIL CONSERVATION ISSUES IN ONTARIO

In order to further assess producer perceptions regarding soil and water conservation, survey respondents ranked a series of statements on soil and water conservation issues in Ontario. The rating scheme utilized for each of the statements is as follows:

1 - Disagree Strongly
2 - Disagree Somewhat
3 - Agree Somewhat
4 - Agree Strongly

The issues presented to the survey respondents were grouped into three distinct categories: policy issues, economic issues, and perceived trends. Mean scores were calculated across all primary survey categories. Total mean scores, in addition to regional survey scores for all soil and water conservation statements, are presented in Table 4.1.

### 4.1 Policy Issues

Producers had a range of opinions on policy related issues although the balance of opinion was generally neutral on issues evaluated.

For example, corn producers were split (2.5 rating) as to whether SWEEP had been successful in educating farmers about soil conservation. They were marginally more positive about the amount of information available on conservation tillage (2.7) and the National Soil Conservation Program's ability to educate farmers about soil conservation (2.7). At the same time producers indicated that perhaps governments were not doing enough to promote soil conservation (2.3).

## TABLE 4.1 * ISSUES REGARDING SOIL & WATER CONSERVATION: REGIONAL DISTRIBUTION & TOTALS (MEAN PERCEPTION SCORES)

| | S & W CONSERVATION ISSUES | TOTAL | ESSEX KENT & LAMBTON | MIDDLESEX & ELGIN | OXFORD HAM BRANT HALD NIAG NORFOLK | HURON PERTH WATERLOO | BRUCE TO HALTON & DURHAM | VICTORIA & EAST |
|---|---|---|---|---|---|---|---|---|
| POLICY | Governments doing enough to promote soil conservation | 2.3 | 2.4 | 2.4 | 2.2 | 2.5 | 2.1 | 2.4 |
| | There is a great deal of conservation tillage information | 2.7 | 2.8 | 3.0 | 2.7 | 2.6 | 2.5 | 2.5 |
| | SWEEP successful in educating farmers about conservation | 2.5 | 2.6 | 2.5 | 2.6 | 2.7 | 2.3 | 2.5 |
| | The NSCP successful in educating farmers about conservation | 2.7 | 2.7 | 2.7 | 2.8 | 2.6 | 2.4 | 2.8 |
| ECONOMIC | Reduced tillage a viable economic alternative to conventional | 2.8 | 2.7 | 3.0 | 2.8 | 2.6 | 2.8 | 2.6 |
| | Switching to conservation tillage would not be costly | 2.1 | 2.0 | 2.1 | 2.1 | 1.8 | 2.1 | 2.4 |
| | Switching to conservation tillage would be low risk | 2.2 | 2.2 | 2.1 | 2.3 | 2.0 | 2.4 | 2.4 |
| | Time savings from no-till corn offsets increase in cost | 2.5 | 2.6 | 2.6 | 2.4 | 2.5 | 2.5 | 2.3 |
| TRENDS | Conservation tillage increasing in Ontario | 3.2 | 3.1 | 3.2 | 3.1 | 3.2 | 3.4 | 3.1 |
| | Farmers making an effort to reduce soil loss/ phosphate run-off | 3.0 | 2.9 | 3.1 | 2.7 | 3.2 | 3.2 | 2.9 |

* Rating Scale of 1 - Disagree Strongly, 2 - Disagree Somewhat, 3 - Agree Somewhat, 4 - Agree Strongly

## 4.2 Economic Issues

Producers had more distinct views on economic issues related to soil and water conservation. Corn producers believe that reduced tillage is a viable economic alternative to conventional tillage. Nevertheless, the majority of respondents indicate that switching to conservation tillage would be both costly (2.1) and high risk (2.2).

Larger scale corn growers were generally more positive about reduced tillage and conservation tillage. These operators perceived reduced tillage as a more viable economic alternative to conventional tillage (3.1), in addition to being less of a risk (2.6) and not as costly (2.3) (Table 4.2).

## 4.3 Perceived Trends

The majority of survey respondents perceive an increase in conservation tillage as well as determined effort to reduce soil loss and phosphate run-off by producers (Table 4.1). Some regional variations exist, however, corn growers in all regions were positive about the direction of conservation tillage and efforts by farmers to reduce soil loss and phosphate run-off in Ontario.

## TABLE 4.2 * SELECTED ECONOMIC ISSUES REGARDING SOIL & WATER CONSERVATION AGAINST FARM SIZE & CORN ACREAGE

| S & W CONSERVATION ISSUE | FARM SIZE | | | | CORN ACREAGE | | | |
|---|---|---|---|---|---|---|---|---|
| | LESS THAN 200 | 200 TO 349 | 350 TO 549 | 550 OR MORE | 10 TO 50 AC. | 51 TO 100 AC. | 101 TO 250 AC. | 251 AC. OR MORE |
| Reduced tillage a viable economic alternative to conventional | 2.6 | 2.8 | 2.8 | 3.0 | 2.7 | 2.8 | 2.9 | 3.1 |
| Switching to conservation tillage would not be costly | 2.0 | 2.1 | 2.1 | 2.2 | 2.0 | 2.1 | 2.1 | 2.3 |
| Switching to conservation tillage would be low risk | 2.1 | 2.2 | 2.3 | 2.5 | 2.1 | 2.3 | 2.3 | 2.6 |

* Rating Scale of: 1 - Disagree Strongly
2 - Disagree Somewhat
3 - Agree Somewhat
4 - Agree Strongly

## 5.0 SOIL AND WATER CONSERVATION PRACTICES AND TRENDS

In order to maintain consistency with previous surveys regarding soil and water conservation in Ontario, conservation practices have been grouped into three principle categories: Tillage Practices; Cropping Practices; and Land Management Practices. The following sections in accordance with these categories, evaluates the current state and perceived trends of soil and water conservation practices occurring on corn producing farms throughout the Ontario corn farming region.

### 5.1 Tillage Practices

The most prevalent and widely employed conservation tillage practice involves a reduced number of passes over the field (53%) (Table 5.1). Chisel plowing (24%) was also a relatively common practice.

No Till cereal planting and No Till row crop planting were only used by 8% and 6% of respondents, respectively. Ridge Tillage was only used by 3% of respondents.

Use of the reduced number of passes over the field varied by corn acreage size, farm size (Table 5.2), farm type, age of operator and region. That is, larger scale corn growers, larger farms, cash crop operators, and younger producers were more likely to be using this practice. For example, almost two thirds of producers in the regions of Middlesex and Elgin, and Victoria and East, reduced the number of tillage passes on their farm during the 1990 crop season.

Use of chisel plowing also varied by corn acreage size, farm size, type of farm and region, but was less variable by age of operator. Producers in Huron, Perth and Waterloo region and small scale farm operators, and hog producers had the lowest levels of use of these two conservation tillage practices within the past year.

Tillage conservation practice trends were recorded for the following categories: conservation tillage, tillage depth and number of passes.

## TABLE 5.1 TILLAGE PRACTICES UTILIZED ON SURVEY FARMS BY REGIONAL STRUCTURE

| TILLAGE PRACTICE | TOTAL | ESSEX KENT & LAMBTON | MIDDLESEX & ELGIN | OXFORD BRANT HAM. NIAG. HALDIMAND NORFOLK | HURON PERTH WATERLOO | BRUCE TO HALTON & DURHAM | VICTORIA & EAST |
|---|---|---|---|---|---|---|---|
| | | | (% of respondents using practice) | | | | |
| Reduced No. of Passes | 53 | 53 | 63 | 49 | 37 | 45 | 68 |
| Chisel Plowing | 24 | 31 | 25 | 23 | 17 | 27 | 22 |
| Contour Plowing | 10 | 6 | 4 | 13 | 20 | 5 | 14 |
| No Till Cereal Planting | 8 | 6 | 6 | 3 | 3 | 17 | 10 |
| No Till Row Crop Planting | 6 | 5 | 5 | 6 | 7 | 13 | 3 |
| Ridge Tillage | 3 | 3 | 6 | 3 | 2 | 2 | 1 |

## TABLE 5.2 TILLAGE PRACTICES UTILIZED BY CORN ACREAGE & FARM SIZE

| TILLAGE PRACTICE | TOTAL | CORN ACREAGE | | | | FARM SIZE (ACRES) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 TO 50 AC. | 51 TO 100 AC. | 101 TO 250 AC. | 251 AC. OR MORE | LESS THAN 200 | 200 TO 349 | 350 TO 549 | 550 OR MORE |
| Reduced No. of Passes | 53 | 44 | 55 | 66 | 79 | 38 | 55 | 72 | 67 |
| Chisel Plowing | 24 | 18 | 24 | 28 | 55 | 15 | 27 | 28 | 39 |
| Contour Plowing | 10 | 11 | 9 | 10 | 10 | 11 | 11 | 7 | 13 |
| No Till Cereal Planting | 8 | 7 | 7 | 5 | 17 | 4 | 9 | 11 | 9 |
| No Till Row Crop Planting | 6 | 5 | 5 | 9 | 17 | 6 | 4 | 9 | 11 |
| Ridge Tillage | 3 | 2 | 3 | 7 | 6 | 3 | 3 | 3 | 5 |

In total, 25% of survey respondents have increased conservation tillage practices over the past two years. Similarly, 25% of respondents have decreased tillage depth, and 14% have reduced the number of tillage passes (Table 5.3). Some producers (4%) had increased their tillage depth over the past two years.

## 5.2 Cropping Practices

Various cropping practices employed by Ontario corn producers are shown in Table 5.4. It is apparent that a similar proportion of Ontario corn producers employ conservation cropping practices and conservation tillage practices. For example, crop plowdown (52%) and winter cover crops (38%) were extensively employed by Ontario producers. Usage of these practices was greater than 30 percent for all regions, with the exception of winter cover crops in the Victoria and East region. Cross slope farming (8%) and strip cropping (8%) were less extensively used. However, the region of Oxford to Haldimand-Norfolk display an above average amount of cross slope farming (16%) and strip cropping (22%).

To further evaluate the trends and relationships regarding conservation cropping practices utilized by Ontario corn producers, increases in cover crops, legume plowdown and crop rotation over the past two seasons was recorded for all survey respondents. In total, only 15% of survey respondents increased their cover crops over the past two seasons. Legume plowdown and crop rotations, however, show increased use with 21% of survey respondents adopting these practices (Table 5.5). Also depicted in Table 5.5 is the farm size and age groups of those producers implementing these conservation practices. Generally, it appears that the most responsive increase in conservation cropping has occurred on the larger farm enterprise and by the younger farm producer.

## 5.3 Land Management Practices

Buffer strips, wind breaks, and grassed headlands were used to assess the extent of land management practices currently being employed by Ontario corn producers. Livestock manure applications and soil testing were the indicators used to assess the historical trends regarding land management and advanced farming practices for the Ontario survey region.

## TABLE 5.3 CHANGE IN TILLAGE PRACTICES OVER THE LAST TWO YEARS BY FARM SIZE AND CORN ACREAGE

| CHANGE IN PRACTICE | TOTAL | CORN ACREAGE | | | | FARM SIZE | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 TO 50 AC. | 51 TO 100 AC. | 101 TO 250 AC. | 251 AC. OR MORE | LESS THAN 200 | 200 TO 349 | 350 TO 549 | 550 OR MORE |
| | | —— % of respondents mentioning —— | | | | | | | |
| Conservation Tillage | | | | | | | | | |
| - Increase | 25 | 21 | 24 | 33 | 41 | 20 | 21 | 36 | 34 |
| - Decrease | 3 | 1 | 6 | 3 | 3 | 2 | 1 | 5 | 7 |
| Tillage Depth | | | | | | | | | |
| - Increase | 4 | 2 | 9 | 3 | 3 | 5 | 3 | 1 | 7 |
| - Decrease | 25 | 28 | 20 | 23 | 28 | 23 | 28 | 27 | 24 |
| Reduced # Tillage Passes | | | | | | | | | |
| - Increase | 1 | 1 | 1 | - | 1 | 2 | - | - | - |
| - Decrease | 15 | 13 | 16 | 15 | 20 | 14 | 16 | 9 | 21 |

## TABLE 5.4 CROPPING PRACTICES EMPLOYED BY ONTARIO CORN PRODUCERS BY REGIONAL DISTRIBUTION

| CROPPING PRACTICE | TOTAL | ESSEX KENT & LAMBTON | MIDDLESEX & ELGIN | OXFORD BRANT HAM. NIAG. HALDIMAND NORFOLK | HURON PERTH WATERLOO | BRUCE TO HALTON & DURHAM | VICTORIA & EAST |
|---|---|---|---|---|---|---|---|
| | — % of respondents using practice — | | | | | | |
| Plowdown Crop | 52 | 56 | 61 | 54 | 61 | 39 | 40 |
| Winter Cover Crop | 38 | 32 | 35 | 34 | 52 | 55 | 19 |
| Cross Slope Farming | 8 | 3 | 7 | 16 | 6 | 9 | 9 |
| Strip Cropping | 8 | 4 | 9 | 22 | 4 | 5 | 5 |
| # of Respondents | 498 | 79 | 79 | 84 | 88 | 80 | 88 |

## TABLE 5.5 TRENDS IN CONSERVATION CROPPING PRACTICES FROM 1988 TO 1990: FARM SIZE DISTRIBUTION; AGE DISTRIBUTION

| CROPPING TREND | TOTAL | -- FARM SIZE (ACRES) -- LESS THAN 200 | 200 TO 349 | 350 TO 549 | 550 OR MORE | -- AGE (YEARS) -- LESS THAN 35 | 35 TO 44 | 45 TO 54 | 55 OR OLDER |
|---|---|---|---|---|---|---|---|---|---|
| | | --- % of respondents --- | | | | | | | |
| Cover Crops: | | | | | | | | | |
| - Increased | 15 | 15 | 16 | 11 | 21 | 21 | 18 | 11 | 11 |
| - Decreased | 2 | - | 2 | 4 | 1 | 2 | 3 | - | 1 |
| Legume Plowdown: | | | | | | | | | |
| - Increased | 21 | 18 | 22 | 22 | 29 | 28 | 26 | 18 | 14 |
| - Decreased | 3 | 2 | 2 | 6 | 2 | 2 | 1 | 4 | 4 |
| Crop Rotation: | | | | | | | | | |
| - Increased | 21 | 18 | 19 | 21 | 31 | 28 | 24 | 17 | 14 |
| - Decreased | 2 | 1 | 3 | 5 | 2 | 4 | 3 | 1 | 1 |

Land management approaches are a popular and extensive form of soil conservation practices employed by Ontario corn producers. A total of 63% of respondents utilized buffer strips on their farm, and a total of 57% of the respondents utilized wind breaks (Table 5.6). Buffer strips and wind breaks were adopted on greater than 50% of the survey farms in all regions, with the exception of the Oxford to Haldimand-Norfolk region where buffer strips were utilized on only 28% of the survey farms. Grassed headlands were not as widely adopted (15%), but showed strong use in the Bruce to Halton and Durham region (37%), and the Victoria and East region (22%).

Changes on survey farms regarding the amount of soil testing and manure applications were also identified. A number of respondents increased their soil testing (14%) and manure applications (12%) over the past two years. At the same time, a number of producers decreased their soil testing activities (8%) and manure applications (6%) (Table 5.7). Obviously, there is an overall increase in these activities but more fluctuation than other areas. Changes in soil testing were linked to farm type and age of operator while changes in manure applications varied by farm type and region.

**TABLE 5.6 LAND MANAGEMENT PRACTICES UTILIZED ON SURVEY FARMS BY REGION**

| LAND MANAGEMENT PRACTICE | TOTAL | ESSEX KENT & LAMBTON | MIDDLESEX & ELGIN | OXFORD BRANT HAM. NIAG. HALDIMAND NORFOLK | HURON PERTH WATERLOO | BRUCE TO HALTON & DURHAM | VICTORIA & EAST |
|---|---|---|---|---|---|---|---|
| | | | | % of respondents using | | | |
| Buffer Strips | 63 | 58 | 77 | 28 | 72 | 74 | 66 |
| Wind Breaks | 57 | 69 | 57 | 52 | 53 | 56 | 57 |
| Grassed Headlands | 15 | 6 | 12 | 15 | 5 | 31 | 22 |
| # of Respondents | 498 | 79 | 79 | 84 | 88 | 80 | 88 |

## TABLE 5.7 CHANGES IN SOIL TESTING AND MANURE APPLICATION 1988–1990 BY FARM TYPE

| PRACTICE | TOTAL | FARM TYPE | | | |
|---|---|---|---|---|---|
| | | CASH CROP | MAINLY DAIRY | MAINLY HOG | LIVESTOCK MIXED OTHER |
| | | % of respondents mentioning | | | |
| **Soil Testing** | | | | | |
| - Increasing | 14 | 13 | 7 | 22 | 19 |
| - Decreasing | 8 | 5 | 16 | 4 | 4 |
| **Manure Application** | | | | | |
| - Increasing | 12 | 5 | 16 | 18 | 14 |
| - Decreasing | 6 | 12 | 2 | 1 | 4 |

## 6.0 REASONS FOR USING CONSERVATION TILLAGE PRACTICES

A comprehensive list of the reasons for implementing conservation tillage practices was developed for the 1990 survey. Many of the primary reasons for adopting conservation tillage focused on a direct concern with soil quality and economic efficiency (Table 6.1).

For example, soil quality considerations included:

1. Saving Topsoil;
2. Reducing Soil Degradation;
3. Reduced Compaction;
4. Preventing Wind Erosion; and
5. Preventing Run Off.

Similarly, economic consideration included:

1. Saving money;
2. Saving time; and
3. Saving fuel.

Generally, soil quality, economics and land management benefits were the primary focus for adopting conservation tillage. Some land management considerations and ethical considerations were also mentioned.

## TABLE 6.1 PRIMARY REASONS FOR IMPLEMENTING CONSERVATION TILLAGE PRACTICES

| TYPE OF PRACTICE | REASONS FOR CONSERVATION TILLAGE | TOTAL % OF RESPONDENTS USING CONSERVATION TILLAGE PRACTICE |
|---|---|---|
| SOIL QUALITY | Saves topsoil | 30 |
| | Reduces compaction | 16 |
| | Prevents wind erosion | 12 |
| | Doesn't degrade the soil | 11 |
| | Prevents runoff | 10 |
| | Drains better | 4 |
| | Improves organic content | 3 |
| LAND MGT | Don't need to cultivate as much | 4 |
| | Weed control | 4 |
| | Excessive Tillage Burns & Soil | 3 |
| ECONOMIC | Saves money | 29 |
| | Saves time | 19 |
| | Saves fuel | 8 |
| ETHICAL | Right thing to do | 6 |

## 7.0 ADVANTAGES AND DISADVANTAGES OF FALL MOULDBOARD TILLAGE

Individuals who did not undertake conservation tillage practices were asked what the advantages and disadvantages of fall mouldboard ploughing were.

Respondents had an exhaustive list of advantages and a much shorter list of disadvantages concerning fall mouldboard ploughing. The primary advantages cited for implementing fall mouldboard tillage are generally practical in nature (Table 7.1). That is:

1. it was the easiest way to cultivate;
2. producers were assured of all soil being turned;
3. producers already had the equipment;
4. it was useful on heavier ground;
5. there were no run-off problems on their farm;
6. crop yields were better;
7. producers were typically too busy in spring;
8. it spread trash evenly; and
9. it contained soil moisture.

In contrast, the disadvantages of fall mouldboard ploughing were primarily vested in:

1. potential soil loss;
2. time consumption; and
3. fuel consumption.

Indeed, most respondents could not think of any disadvantages of mouldboard ploughing.

## TABLE 7.1 ADVANTAGES AND DISADVANTAGES OF FALL MOULDBOARD PLOUGHING

| ADVANTAGES | % OF RESPONDENTS USING MOULDBOARD PLOUGHING ONLY | DISADVANTAGES | % OF RESPONDENTS USING MOULDBOARD PLOUGHING ONLY |
|---|---|---|---|
| Easiest way to cultivate | 24 | Don't know any disadvantage | 33 |
| Assured of all soil turned | 22 | Soil loss | 26 |
| Already have the equipment | 9 | No disadvantage | 12 |
| Heavier ground | 7 | Time consuming | 12 |
| Yield advantages/better yield | 7 | Fuel consumption | 11 |
| Don't have run-off problem | 6 | Cost | 4 |
| Spreads trash evenly | 6 | | |
| Don't lose moisture | 6 | | |
| Too busy in spring | 5 | | |
| Always been effective | 5 | | |
| Early start in spring | 5 | | |
| No need to change practice | 4 | | |
| Weed control | 4 | | |
| Good tillage | 4 | | |